Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for locating and characterizing a generally rectangular-shaped object in an image by creating an abstract rectangular model of the generally-rectangular shaped object, the method comprising:

receiving an image;

identifying boundary data objects in the image, each boundary data object representing a single point in the image having a ~~specified~~ quantified location and orientation;

selecting, using the boundary data objects, a primary angle that describes a potential orientation of ~~a~~ an abstract rectangular model of the generally rectangular shaped object in the image, the abstract rectangular model having four sides;

finding a first set of lines defined by groups of boundary data objects that lie generally along the direction of the primary angle;

finding a second set of lines defined by groups of boundary data

objects that lie generally along a direction orthogonal to the primary angle;

and

locating pairs of lines from the first set of lines, and pairs of lines from

the second set of lines, that together form the four sides of the abstract model

of the generally rectangular shaped object in the image.

Claim 2 (currently amended): The method of claim 1, wherein finding the first

set of lines includes assigning a score value to each line in the first set of lines

based on the likelihood that each said line corresponds to a side of the

rectangle generally rectangular shaped object.

Claim 3 (original): The method of claim 2, wherein the score value for each

said line is computed based on the number of boundary data objects

contributing to the line.

Claim 4 (currently amended): The method of claim 3, wherein the score values

are used in locating the pairs of lines that form the four sides of the abstract

rectangular model of the generally rectangular shaped object in the image.

Claim 5 (currently amended): The method of claim 1, wherein the act of locating pairs of lines from the first and second set of lines additionally includes refining the pair of lines from the first set of lines by re-calculating the pair of lines from the first set of lines as a first refined pair of lines having a slope equal to an average of the slope slopes of the unrefined pair pairs of lines.

Claim 6 (currently amended): The method of claim 5, wherein the act of locating pairs of lines from the second set of lines additionally includes refining the pair of lines from the second set of lines by re-calculating the pair of lines from the second set as a second refined pair of lines having a slope equal to the negative reciprocal of the slope of the first refined pair of lines average slope of the pair of lines of the first set.

Claim 7 (currently amended): The method of claim 1, further including:

successively incrementing the primary angle and repeating the acts of finding the first set of lines, finding the second set of lines, and locating the pairs of lines for each said increment of the primary angle, wherein

~~rectangles corresponding to~~ abstract rectangular models of the generally rectangular shaped object are located in any of the increments of the primary angle.

Claim 8 (currently amended): A method for locating and characterizing a generally rectangular-shaped surface mounted device (SMD) in an image by creating an abstract rectangular model of the generally-rectangular shaped surface mounted device (SMD), the method comprising:

receiving an image of a surface mounted device (SMD) for a printed circuit board, the SMD having a generally rectangular shape;

automatically generating an abstract rectangular model of the SMD based on the received image, the abstract rectangular model including at least the length and width of dominant edges in the SMD that contribute to the rectangular shape of the SMD, including:

extracting boundary data objects in the image, each boundary data object representing a single point in the image having a quantified location and orientation;

selecting, using the boundary data objects, a primary angle that describes a potential orientation of the abstract rectangular model of the surface mounted device (SMD), the abstract rectangular model having four sides;

finding a first set of lines defined by groups of boundary data objects that lie generally along the direction of the primary angle;

finding a second set of lines defined by groups of boundary data objects that lie generally along a direction orthogonal to the primary angle; and

locating pairs of lines from the first set of lines and pairs of lines from the second set of lines that together form the four sides of the abstract rectangular model of the surface mounted device (SMD); and

training an object location algorithm, based on the generated abstract rectangular model, to locate the SMD in succeeding images.

Claim 9 (currently amended): The method of claim ~~1~~ 8, wherein the abstract

rectangular model additionally includes position and orientation information of

the ~~SMD~~ surface mounted device (SMD) in the received image.

Claim 10 (canceled)

Claim 11 (currently amended): A computer system for locating and

characterizing a generally rectangular-shaped object in an image by creating

an abstract rectangular model of the generally-rectangular shaped object, the

computer system comprising:

   a processor; and

   a computer memory, the computer memory containing at least one

image of an object having a generally rectangular shape and containing

computer instructions, which, when executed by the processor, identifies

boundary data objects, based on the image of the object, at a primary angle

and at an angle orthogonal to the primary angle, and locates pairs of parallel

lines in each of the primary angle and the angle orthogonal to the primary

angle; wherein

the computer system identifies ~~edges of a rectangle~~ pairs of lines for

forming an abstract rectangular model generally ~~describing~~ conforming to the

rectangular shaped object ~~based on the pair of parallel lines~~.

Claim 12 (original): The computer system of claim 11, further including an

image formation unit connected to the processor and configured to generate

the at least one image.

Claim 13 (currently amended): A computer readable medium containing

computer instructions, that when executed by a processor, locates ~~rectangles~~

~~corresponding to~~ and characterizes a generally rectangular shaped object in

an image by creating an abstract rectangular model of the generally

rectangular shaped object, and thereby causing a processor to:

receive an image having at least one generally rectangular shaped

object;

identify boundary data objects in the image, each boundary data object

representing a single point in the image having a ~~specified~~ quantified location

and orientation;

select, using the boundary data objects, a primary angle that describes

a potential orientation of the abstract rectangular model of the at least one

generally rectangular shaped objects object in the image;

find a first set of lines defined by groups of boundary data objects that

lie generally along the direction of the primary angle;

find a second set of lines defined by groups of boundary data objects

that lie generally along a direction orthogonal to the primary angle; and

locate pairs of lines from the first set of lines and pairs of lines from the

second set of lines that together form the four sides of the abstract

rectangular model of the at least one generally rectangular shaped object in

the image.

Claim 14 (currently amended): The computer readable medium of claim 13,

wherein finding the first set of lines includes assigning a score value to each

line in the first set of lines based on the likelihood that each said line

corresponds to a side of the rectangle generally rectangular shaped object.

Claim 15 (original): The computer readable medium of claim 14, wherein the score value for each said line is computed based on the number of boundary data objects contributing to the line.

Claim 16 (currently amended): The computer readable medium of claim 15, wherein the score values are used in locating the pairs of lines that form the four sides of the abstract rectangular model of the generally rectangular shaped object in the image.

Claim 17 (currently amended): The computer readable medium of claim 13, wherein the act of locating pairs of lines from the first and second set of lines additionally includes refining the pair of lines from the first set of lines by re-calculating the pair of lines from the first set of lines as a first refined pair of lines having a slope equal to an average of the slope slopes of the unrefined pair pairs of lines.

Claim 18 (currently amended): The computer readable medium of claim 17, wherein the act of locating pairs of lines from the second set of lines additionally includes refining the pair of lines from the second set of lines by re-calculating the pair of lines from the second set as a <u>second refined</u> pair of lines having a slope equal to the negative reciprocal of the <u>slope of the first refined pair of lines</u> ~~average slope of the pair of lines of the first set~~.

Claim 19 (currently amended): The computer readable medium of 13, the computer instructions further causing processor to:

successively increment the primary angle and repeating the acts of finding the first set of lines, finding the second set of lines, and locating the pairs of lines for each said increment of the primary angle, wherein

~~rectangles corresponding to~~ <u>abstract rectangular models of</u> the generally rectangular shaped object are located in any of the increments of the primary angle.